

AMENDED CLAIMS

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Original claims 1-17 replaced by new claims 1-16 (5 pages)]

1. Device for extraction of pins at fixation means
for fixation of bone fragments at bone fractures,

wherein the fixation means (2) includes a sleeve (6)
and at least one pin (7) provided in said sleeve (6),

5 wherein the sleeve (6) at a front end portion (9)
has at least one opening (10) in a longitudinal side
thereof,

wherein a front part (11) of the pin (7) extends,
when said pin (7) is located in an operating position,
10 out of the sleeve (6) through the opening (10) and engage
bone material of one of the bone fragments (3, 4), and

wherein the extraction device (1) is adapted to pull
the pin (7) in a backwards direction relative to the
sleeve (6) in order to withdraw the front part (11) of
15 the pin (7) from bone material of one of the bone frag-
ments (3, 4) and into the sleeve (6),

c h a r a c t e r i z e d i n

that the extraction device (1) comprises an inner
extraction member (12) which is connectable to the pin (7),
20 an outer extraction member (13) which is connectable to
the sleeve (6) and in which the inner extraction member
(12) is insertable and an extraction handle (14) which
is rotatable relative to the outer and inner extraction
members (13, 12) in order to extract the pin (7) in a
25 direction (R) of extraction or withdrawal relative to
the outer extraction member (13) and the sleeve (6),

that the outer extraction member (13) is manually
holdable in order to prevent that the outer extraction
member (13) could rotate when the extraction handle (14)
30 is rotated, and

that the outer and inner extraction members (13, 12)
are constructed such that the outer extraction member (13)
prevents that the inner extraction member (12) could ro-
tate relative to the outer extraction member (13) when
35 the extraction handle (14) is rotated.

2. Device according to claim 1, c h a r a c t e r i -
z e d i n

that the outer and inner extraction members (13, 12)
are provided with rotary preventing members (32, 29),

5 which could cooperate with each other in order to pre-
vent that the inner extraction member (12) could rotate
relative to the outer extraction member (13),

that the rotary preventing members (32) of the outer
extraction member (13) are non-circular parts of a through
10 hole (33) in the outer extraction member (13), and

that the rotary preventing members (29) of the inner
extraction member (12) are non-circular parts.

3. Device according to claim 2, c h a r a c t e -
r i z e d i n

15 that the rotary preventing members (32) of the outer
extraction member (13) are provided in a rear end portion
(31) of the outer extraction member (13), and

that the rotary preventing members (29) of the inner
extraction member (12) are provided on a rear end por-
20 tion (24) of the inner extraction member (12).

4. Device according to claim 3, c h a r a c t e -
r i z e d i n that the lengths of the inner and outer
extraction members (12, 13) and the location and shape of
their rotary preventing members (29, 32) are chosen such
25 that the extraction handle (14) can cooperate with the
inner extraction member (12) only in order to draw or pull
said inner extraction member (12) backwards in the direc-
tion of extraction or withdrawal (R) only when said inner
extraction member (12) is inserted into the outer extrac-
30 tion member (13) such that their rotary preventing mem-
bers (29, 32) cooperate with each other.

5. Device according to any preceding claim, c h a -
r a c t e r i z e d i n that at least one part (26
and/or 23) limiting the extraction or withdrawal is pro-
35 vided in order to ensure that the extraction handle (14),
through the inner extraction member (12), can draw or

pull the pin (7) backwards so far relative to the sleeve (6), but not farther, that a tip (35) of the pin (7) is situated in the opening (10) of the sleeve (6), and can thereby cooperate with a rear edge of the opening (10) such that the pin (7), through said cooperation with the rear edge of the opening (10), can draw or pull the sleeve (6) backwards along with it in the direction of extraction or withdrawal (R) when the sleeve (6) shall be pulled out of the bone fragment (3, 4) by means of the extraction handle (14).

6. Device according to claim 5, characterized in that said extraction limiting part (26 and/or 23) consists of that the extraction handle (14) has outer threads (26) with such length and/or that the inner extraction member (12) has inner threads (23) with such length that the length of screwing together of the outer threads (26) of the extraction handle (14) and the inner threads (23) of the inner extraction member (12) is limited.

7. Device according to any preceding claim, characterized in

that a rear part (18) of the pin (7) has outer threads (17),

that a front end portion (15) of the inner extraction member (12) has a hole with inner threads (16) which mesh with the outer threads (17) of the pin (7), and

that the hole of the inner extraction member (12) has an inlet (22) without threads, said inlet (22) tapering conically in a direction inwards into the hole, and/or

that the rear part (18) of the pin (7) has an outer portion without threads, said outer portion having a conically increasing diameter in a direction towards the outer threads (17) of the rear part (18).

8. Device according to any preceding claim, characterized in that the inner extraction member (12) has a front end portion (15) with such outer

dimensions or size that it can be inserted into a rear end portion (8) of the sleeve (6).

9. Device according to claim 8, c h a r a c t e -
r i z e d i n that the front end portion (15) of the
5 inner extraction member (12), which can be inserted into
a rear end portion (8) of the sleeve (6), transforms into
inner portions (20) of the inner extraction member (12)
having larger outer dimensions through an edge (19) which
can engage a rear edge (21) of the sleeve (6) when the
10 inner extraction member (12) is operating.

10. Device according to any preceding claim, c h a -
r a c t e r i z e d i n

that the inner extraction member (12) is an elonga-
ted rod and has a front end portion (15) with a hole which
15 is provided with inner threads (16) which mesh with outer
threads (17) on the pin (7),

that the inner extraction member (12) has a rear end
portion (24) with a hole with inner threads (23) which
fit or mesh with outer threads (26) on the extraction
20 handle (14),

that the outer extraction member (13) is an elonga-
ted sleeve which is open in both ends, and

that the inner extraction member (12) fits into the
outer extraction member and is axially displaceable in
25 relation thereto.

11. Device according to claim 10, c h a r a c t e -
r i z e d i n that the inner extraction member (12)
includes lateral holes (36, 37) which extend into the
holes with the inner threads (16, 23) such that said
30 holes can be flushed clean through said lateral holes
(36, 37).

12. Device according to any preceding claim, c h a -
r a c t e r i z e d i n that the outer extraction mem-
ber (13) has a sideways or laterally directed handle (34)
35 for holding said outer extraction member (13) such that
it does not rotate when the pin (7) is drawn or pulled
out in the direction of extraction or withdrawal (R).

13. Device according to any preceding claim, c h a -
r a c t e r i z e d i n that the device consists of
only three members, namely an inner extraction member
(12), an outer extraction member (13) and an extraction
5 handle (14).

14. Device according to any preceding claim, c h a -
r a c t e r i z e d i n
that the opening (10) in the sleeve (6) is round or
oval or substantially round or oval, and
10 that the front part (11) of the pin (7) has a roun-
ded side by means of which it can cooperate with front
parts of the opening (10), and another side, opposite to
said side, which is flat or substantially flat and which
can cooperate with rear parts of the opening (10).

15 15. Device according to any preceding claim, c h a -
r a c t e r i z e d i n that the sleeve (6) and pin
(7) are made of titanium.

16. Device according to any of claims 1-14, c h a -
r a c t e r i z e d i n that the sleeve (6) and pin
20 (7) are made of stainless steel.